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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

WRITER'S DIRECT NO.

(202) 828-0155

September 1, 2000

BY HAND

Ms. Magalie Roman Salas
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

Re: Ex Parte Presentations
CC Docket No. 94-102

Dear Ms. Salas:

On behalf of my client QUALCOMM Incorporated ("QUALCOMM"), this is to report that on August 31, 2000, representatives of QUALCOMM met with Chairman William E. Kennard, Thomas Sugrue, Chief of the Wireless Telecommunications Bureau, and Clint Odom, Legal Advisor to Chairman Kennard; Mark Schneider, Senior Legal Advisor to Commissioner Ness; Bryan Tramont, Legal Advisor to Commissioner Furchtgott-Roth; and Peter Tenhula, Legal Advisor to Commissioner Powell. In these meetings, QUALCOMM distributed the attached materials, including the document entitled "Summary," which summarizes QUALCOMM's presentation. QUALCOMM's representatives were Dr. Irwin Jacobs, CEO; Steve Poizner, Presdient, Snap Track, Inc., a subsidiary of QUALCOMM; Ellen Kirk, Vice President, Strategic Planning and Marketing, Snap Track; Jonas Neihardt, Vice President, Federal Affairs, and myself (only Ms. Kirk, Mr. Neihardt, and myself attended the meeting with Mr. Tenhula).

In sum, QUALCOMM explained in these meetings that there are reasonable alternatives to the grant of the waiver of the Commission's rules advocated by VoiceStream Wireless ("VoiceStream"), a large, well funded international wireless carrier, and the Commission should deny VoiceStream any waiver at this time. As set forth herein, there are two compliant alternative technologies available to GSM carriers for which standards have been issued by TIA and ETSI. In fact, equipment for one of these compliant technologies, Time of Arrival ("TOA") is being offered commercially by Omnipoint Technologies, Inc. ("Omnipoint Technologies"), which until recently was a subsidiary of VoiceStream. As a result, the Commission should deny

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a waiver to VoiceStream because VoiceStream, which has not even filed a waiver request with the Commission, has not met its burden of showing the lack of a reasonable alternative to grant of a waiver.

Moreover, QUALCOMM also pointed out the gross deficiencies in the data submitted by VoiceStream to justify the waiver. As explained herein, the data simply does not address the performance of E-OTD, the technology VoiceStream is promising it will use, in the areas that most need E9-1-1 service, including highways, rural areas, and crowded urban centers. The data is unreliable and clearly insufficient on its face. The data reflects no attempt to comply with OET's own guidlines for testing and verifying the accuracy of wireless location systems. The data is obviously selected to avoid showing how the technology will perform in anything but the most ideal setting. Without any indication as to the performance of E-OTD in anything but the most ideal setting possible, a suburban/commercial area that presented no multi-path problems and that was perfectly suited for good base station visibility and geometry, the Commission has no basis for reaching any conclusions as to how this technology will perform in general and thus as to whether it is in the public interest to grant a waiver of the accuracy rules. The Commission should not waive the accuracy rules, which are designed based on public safety's requirements as to what is necessary to protect lives, so that VoiceStream can use this inadequately tested technology.

At minimum, before the Commission could make any public interest determination regarding, much less grant, a waiver to VoiceStream, the Commission would have to require VoiceStream, like all Commission licensees, to file a waiver request with complete, not selective, data showing the performance of E-OTD across a representative range of its service areas from which 9-1-1 calls could be expected. And, consistent with Commission rules (47 C.F.R. §1.925 (b)(3)), VoiceStream would have to specify the precise terms of the waiver sought, pleading with particularity the facts and circumstances which warrant the waiver (including a showing that the underlying purpose of the accuracy rule would not be served or would be frustrated by application of the rule to VoiceStream, or in view of unique or unusual factual circumstances of the instant case application of the accuracy rule to VoiceStream would be inequitable, unduly burdensome or contrary to the public interest, or VoiceStream has no reasonable alternative). As QUALCOMM explained in the meetings, and as summarized herein, VoiceStream has not made the necessary showing at this juncture to permit the Commission to grant a waiver.

I. VoiceStream Has Reasonable Alternatives to a Waiver

GSM carriers, such as VoiceStream, have available three alternative positioning mechanisms standardized by TIA and ETSI: Time of Arrival ("TOA"), global positioning system ("GPS"), and E-OTD. TOA is an uplink-based network technology. As the attached materials demonstrate, equipment for TOA is being offered commercially by Omnipoint Technologies, which was originally a wholly-owned subsidiary of Omnipoint Communications and became a wholly-owned subsidiary of VoiceStream until its recent sale in June 2000 to Xircom. VoiceStream has a seat on Xircom's board and the two companies have an alliance.

According to the attached materials, Omnipoint Technologies is working with Ericsson on a TOA product line. Moreover, the attached materials from Omnipoint Technologies' web site as of yesterday state that Omnipoint Technologies, which says that it has been involved in wireless network design and integration for more than a decade, including some of the pioneering GSM installations in North America, offers a location measurement unit for GSM systems, its TOA solution, "the first multiple location technology to be standardized for GSM networks." Omnipoint Technologies states that its location measurement unit based on TOA "meets all the demands of Phase 2 of the FCC's regulatory requirements for implementation by October 2001."

VoiceStream cannot show that it lacks an alternative to a waiver. VoiceStream's ex parte filings in this proceeding do not reflect any discussion of TOA, which was the first positioning mechanism to be standardized for GSM.[1] Its own former subsidiary is offering commercially a compliant technology to GSM carriers such as VoiceStream. Given that VoiceStream owned Omnipoint Technologies until June 2000, VoiceStream certainly could have adopted Omnipoint Technologies' solution and had equipment commercially available in time to meet the FCC's October 2001 deadline, as Omnipoint Technologies states. On this basis alone, the Commission should deny any waiver to VoiceStream.

In addition, as QUALCOMM has already demonstrated in this proceeding, VoiceStream has another reasonable alternative to a waiver: GPS-enabled handsets. QUALCOMM's wireless-assisted GPS technology has been licensed by its Snap Track division to Texas Instruments and Motorola, which make the vast majority of chips for GSM carriers. Ericsson licensed GPS technology from SiRF Technology ("SiRF") more than two years ago and has been actively developing integrated GPS and wireless technology for more than three years, as evidenced by Ericsson's filing of its first patent application related to the integration of GPS and wireless technology in September 1997.[2] VoiceStream's claim that its handset manufacturers cannot

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[1]TOA was standardized by TIA in January 2000 and by ETSI in April 17, 2000.

[2]As shown in QUALCOMM's prior ex parte filings, Nokia invested $3 million in SiRF , and Ericsson publicly announced that it had selected SiRF's technology to develop a GPS solution. While Nokia and Ericsson have attempted to deny that they have had access to GPS technology for a substantial period of time, the facts are that Ericsson applied for two patents in 1997 related to the integration of GPS and wireless technology, and Ericsson licensed SiRF's technology in 1998. Patent Nos. 6041222, Granted 3/21/00, Applied for 9/8/97; and Patent No. 6097974, Granted 8/1/00, Applied for 12/12/97. Motorola has complained about changes to Snap Track's technology, but the fact is that Motorola has had a full and fair opportunity to develop chipsets based on Snap Track's intellectual property. The inescapable conclusion is that Motorola, Nokia, and Ericsson could have developed chipsets based on GPS technology, but have chosen not to do so because they license, but do not own, the technology, and they do not wish to pay royalties to the licensors. That is an understandable self-serving business strategy,

deliver handsets incorporating GPS technology in the volumes and timeframes mandated by the Commission begs the question, since VoiceStream also cannot implement E-OTD with the accuracy mandated by the Commission's rules in the time frames mandated by the Commission.[3] VoiceStream has not placed orders with handset manufacturers for the GPS technology. VoiceStream has chosen not to implement this compliant technology. Instead, it wants a waiver to implement a much less accurate technology for a full two years. Without VoiceStream placing an order for handsets, from VoiceStream, the Commission cannot make any reliable conclusion as to the timeframes and volumes in which handset manufacturers could deliver GPS-enabled handsets to VoiceStream.

Indeed, contrary to the claims of Nokia, Motorola, and Ericsson ("NME") in this proceeding, QUALCOMM's solution has been extensively tested by GSM carriers in Europe, and at least one major European carrier is working with a handset vendor to roll out handsets within the FCC's time frames for volume shipments. NME have noted that the handsets used in the European tests were prototypes provided by Motorola and were not integrated. The eleven European carriers who participated in the tests would have used whatever handsets Motorola provided. Motorola chose not to integrate the GPS technology into the handsets, which is not surprising, since no GSM carrier has yet placed a handset order with Motorola, since they have b been no handsets available for test. Motorola's choice not to provide an integrated handset on its own for the test is no basis for the Commission to conclude that such integration is not possible if GSM carriers order integrated handsets as a consequence of the Commission refusing to waive its rules or to offer innovative, differentiated services to their subscribers.

The fact is that the European tests showed that QUALCOMM's technology works on GSM systems and would meet the FCC's accuracy rules. If a carrier such as VoiceStream placed an order for handsets in substantial volumes, QUALCOMM has no doubt that the necessary integration could be completed, and the handsets brought to market. Until orders are placed, the handsets undoubtedly will not be available; but if orders were placed, surely some handset manufacturers, possibly NME or more aggressive manufacturers, would strive to satisfy those orders in the interests of building or maintaining customer relationships. Without such orders, NME's draconian, speculative predictions as to time requirements can carry little credence.

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but it is no basis upon which to make public policy, especially policy related to public safety.

[3]Motorola's complaint that the gpsOne solution for CDMA carriers in QUALCOMM's MSM3300 chipset is not present in QUALCOMM's next generation chipset is equally baseless. The gpsOne solution will be available in QUALCOMM's MSM5100 chipset, which will support the next generation CDMA standard, cdma2000. Thus, QUALCOMM's solution will incorporate the functionality of next generation handsets, and these solutions will be available to the public if and only if the Commission keeps the current accuracy rules in place so that carriers implement compliant solutions rather than seek waivers to offset the competitive advantage that VoiceStream will gain through grant of a waiver.

Thus, VoiceStream's statement that GPS handsets cannot be delivered in the volumes and the timeframes required by the FCC is unsupported, conclusory, and no substitute for a detailed showing that this alternative is truly unavailable. GPS technology is compliant, technologically available, and it could be commercially available, as it may be in Europe and elsewhere, if VoiceStream chooses to implement it and if VoiceStream placed real firm orders with handset manufacturers for it, insisting upon delivery as soon as possible.

II. VoiceStream's Test Data Is Unreliable and Insufficient

Three sets of data on tests of E-OTD technology have been filed by Aerial and VoiceStream to justify a waiver of the Commission's accuracy rules. This data is clearly insufficient to draw any valid conclusion about the performance of E-OTD on a nationwide basis, has purposely been selected to avoid presenting the performance of E-OTD in anything other than the most ideal conditions, and does not constitute a legitimate basis upon which to grant a waiver to VoiceStream.

The first test was conducted in August 1999. At that time, the Commission's accuracy rule for a network solution called for accuracy of 125 meters 67% of the time. Accordingly, the test showed accuracy of better than 98 meters 67% of the time and accuracy of better than 125 meters 83% of the time, all over 9,000 fixes. This test was conducted in a 150 square kilometer area (a circle with a less than 5 mile radius) in Cambridge, England. This area tends to be very flat, with buildings that rise only 2-3 stories, with little multipath, creating an environment very favorable for cell site visibility. Three measurement sets at 15 second intervals were used for averaging, and thus each fix required 45 seconds. Three sets were required to improve single set accuracy by 60%. This test was not in anything close to real world, challenging conditions, and even so the test gives the Commission no indication that VoiceStream can achieve the 50 meter accuracy it promises to achieve in 2003 in the hope of winning its waiver.

The second test was conducted in conditions even more ideal to obtain a superficially appealing, but unrepresentative result. This test was taken in the absolute middle of a triangle comprised of three base stations plus an additional location measurement unit, also in Cambridge, England with its very favorable topography. Moreover, only 300 fixes were taken in a 4.2 square kilometer area (equivalent to a circle with a 3/4 mile radius. (By contrast, the tests conducted by the eight carrier Snap Track CDMA Test Group in Tampa, Florida comprised more than 9,000 cold start, single point fixes in twenty different environments with different signal characteristics.) In the second E-OTD test, five two-minute measurement sets were taken, so each fix required ten minutes to achieve. This was not a real-world test. Only by using these highly favorable, contrived conditions was accuracy of better than 50 meters 69% of the time achieved. Again, the Commission cannot draw any conclusion about the ability of VoiceStream to locate wireless 9-1-1 callers throughout the United States, with the speed PSAPs require on the basis of this test data.

Finally, most recently, VoiceStream submitted its Houston test data. This test was conducted in a 23 square kilometer area (equivalent to a circle with a 1.7 mile radius. A topographic map of the test area shows it to be virtually flat, with mostly single story buildings and little possibility of multipath. VoiceStream's summary of its ex parte meeting about the test data with Chairman Kennard's staff states that the data was collected in real time, but it does not state how long each fix took to accomplish. Only by limiting the test to these highly favorable conditions and limiting the number of fixes to 500, as opposed to the Snap Track test with 9000 fixes in 20 different environments, VoiceStream was able to achieve accuracy of better than 56 meters 67% of the time and better than 150 meters 99% of the time. This test is inherently unreliable because the conditions were purposely limited to those best suited to E-OTD performance; the number of fixes was so limited; and, the time necessary to achieve the fixes was not disclosed.

Over and above the foregoing factors which make these tests unreliable and biased, the tests make no attempt to comply with OET's "Guidelines for Testing and Verifying the Accuracy of Wireless E911 Location Systems," published on April 12, 2000. Those guidelines state that testing of areas "to include the same geographic sub-area in two more or test areas" which is relatively undemanding for location technology" are "unacceptable." The guidelines also provide that location systems are to operate effectively in conditions where 911 calls are made, such as from within vehicles at highway speeds. VoiceStream and Aerial have not submitted any test of an E-OTD system in a moving vehicle. Finally, the guidelines require that a sufficient number of observations be included to establish compliance with the FCC accuracy requirements with a statistical confidence of 90 percent. But, the VoiceStream/Aerial tests all required extended periods of time for the fixes, and there has been no showing that the small number of fixes that purport to demonstrate that E-OTD can achieve 50 meter accuracy constitute anything close to a sufficient number for the Commission to have a statistical confidence of 90 percent. The test data before the Commission is biased, unreliable, and not close to a sufficient basis to grant a waiver to VoiceStream.

III. Conclusion

This purpose of this proceeding is supposed to be to bring about enhanced 911 service so that users of wireless phones will be able to receive substantially the same level of protection from public safety entities that users of landline phones now enjoy. A grant of a waiver to VoiceStream, a large, well funded international carrier, will undermine the accuracy rules that the Commission has put in place for this purpose and will lead to rampant delay as other carriers rightfully seek to level the playing field by obtaining similar waivers, rather than implementing solutions that comply with the Commission's rules. For this reason, and all of the other reasons advanced by QUALCOMM in the meetings, in its prior filings, and in this letter, QUALCOMM urges the Commission to deny VoiceStream a waiver or, at minimum, to issue its reconsideration

order now without any grant of the VoiceStream waiver and to require VoiceStream to file a

waiver request in compliance with the Commission's procedural rules, including complete test data demonstrating the performance of its preferred technology in all settings and the lack of a reasonable alternative in more than a conclusory fashion.

Sincerely yours,

Dean R. Brenner
Attorney for QUALCOMM Incorporated

cc: Chairman William E. Kennard
Thomas Sugrue, Esq.
Clint Odom, Esq.
Mark Schneider, Esq.
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Peter Tenhula, Esq.
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Kris Monteith, Esq.
Blaise Scinto, Esq.
Dan Grosh, Esq.

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Summary

- **A Waiver Will Delay Phase II Implementation** Granting the VoiceStream waiver will jeopardize negotiations between manufacturers and operators for all air interfaces, as operators will seek similar relaxation of the Commission's rule.
- **VoiceStream's Situation Is Not Unique** E-OTD, or its architectural equivalent, can be deployed on a number of air interfaces besides GSM, and compliant location technologies are available for GSM.
- **Public Safety Will Be Disserved by Diminished Accuracy** Relaxation of the accuracy requirement by a factor of two will result in an increase in the necessary search area by a factor of four.

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A Waiver Will Delay Phase II Implementation

- Negotiations between manufacturers and operators for the development and delivery of compliant E9-1-1 Phase II solutions are underway
  - Those negotiations will likely break off if the VoiceStream waiver is granted, as operators will seek similar treatment
  - The upcoming 10/1/00 filing date is a logical time for operators to indicate they wish to pursue the "VoiceStream conditions"
- Giving a single, nationwide carrier a lower-cost "easy out" of the FCC's rules will skew the competitive playing field
  - Other operators will behave rationally to level the field
  - All operators will call into question the Commission's resolution to maintain the mandate for all (any) operators

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VoiceStream's Situation is Not Unique

- Architecturally, E-OTD and AFLT (the technology Sprint is being denied) are identical
  - A VoiceStream waiver will provide a perfect roadmap and considerable incentive for CDMA operators to pursue AFLT and delay the introduction of high precision handset technology
- The FCC will have no legal basis for denying waivers under identical conditions to any operator if the proposed waiver is granted to VoiceStream
  - While E-OTD may not be usable for some air interfaces, the technology certainly is not unique to GSM
  - Motorola has developed and tested an E-OTD system for the iDEN air interface (Nextel)

AFLT - E-OTD Comparison

- Both techniques rely on the handset contacting three adjacent base stations, and time stamping the signals as they are received.

- Both systems then use the time stamp data to calculate the distance of the handset from the three observed base stations and determine the handset's location through triangulation.

- Operationally, there is no difference between these two techniques. If the FCC allows one operator to use E-OTD, there is no justification to deny a different operator's use of AFLT.

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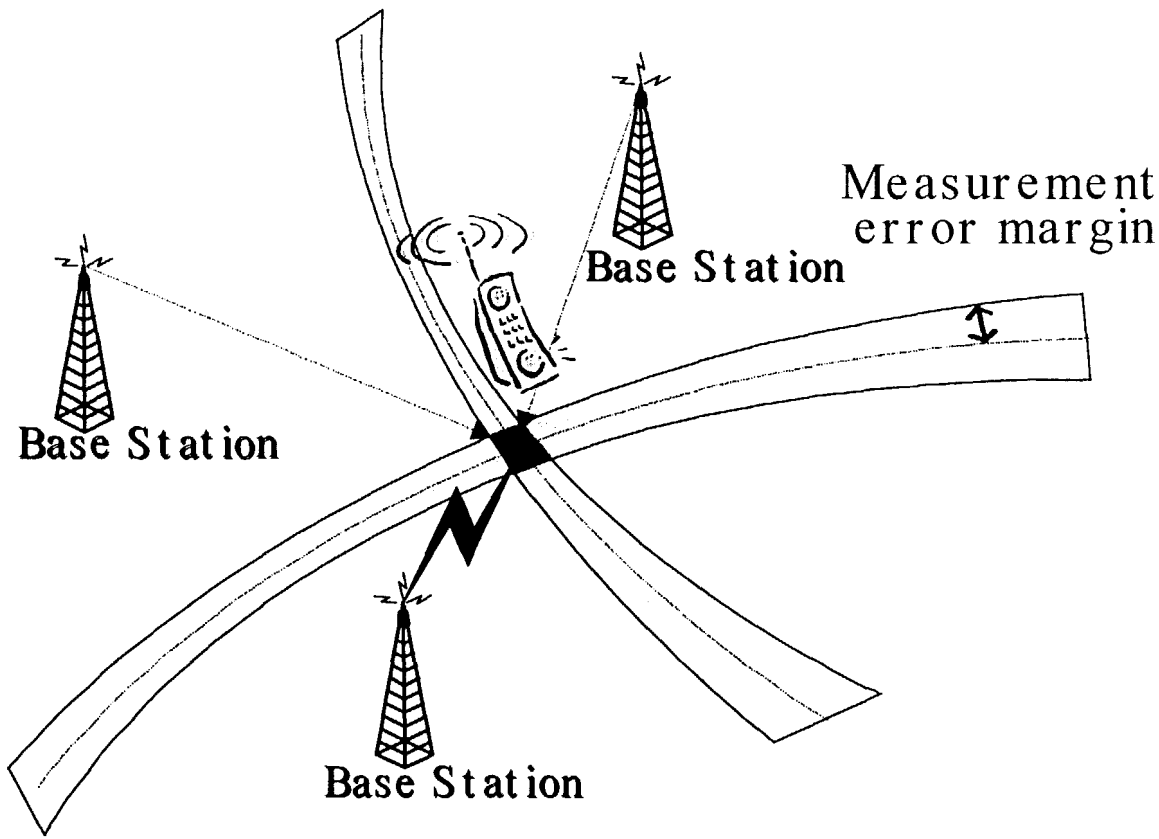
E-OTD & AFLT



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GSM Has Compliant Alternatives

- A network solution (Uplink Time of Arrival) was the first location technology to be standardized by North American GSM
  - This technology is being offered by Omnipoint Technologies, a subsidiary of VoiceStream until earlier this summer
- Wireless assisted GPS has been demonstrated to perform with high accuracy across a full range of operating environments on GSM networks
  - This technology has been broadly licensed for use in GSM handsets
  - Several European carriers are proceeding towards commercialization of wireless assisted GPS

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Diminished Accuracy Disserves Public Safety

- The Commission itself requires handset-based solutions to be held to a higher accuracy standard to help locate callers more quickly and assist PSAPs in handling 9-1-1 calls more efficiently[1]
  - The 500-1000 meter "safety net" proposed by VoiceStream has been described by APCO as "not useful" for public safety for actually locating distress victims.
  - The practical impact of quadrupling (100 meter v. 50 meter accuracy) the search space is significant
- The net effect of the VoiceStream waiver will be to halt real progress on compliant E9-1-1 Phase II solutions

[1]Third Report and Order

Weather

Today: *Fog early, partly sunny. High 80. Low 70.*
Wednesday: *Partly sunny, humid. High 88. Low 72.*

Details, Page **B8**

123RD YEAR NO. 268 S

The Washington Post

TUESDAY, AUGUST 29, 2000 M2

Cell Phone, Cool Heads Save Woman

Arlington Case Highlights Difficulty of Tracing Calls

By PATRICIA DAVIS
Washington Post Staff Writer

Almost immediately after taking her 911 call, James Keaton sensed that the woman on the other end of the line was in trouble, but she couldn't say why. She wasn't answering his questions directly, and she was chatting on the wireless phone like he was a friend.

"Where are you?" Keaton asked. "What's the problem?" Her answers made Keaton, a 911 call-taker with 21 years on the job in Arlington, realize that she wasn't in a position to talk. He changed his tactics—asking simple yes-or-no questions—and soon determined that she had been forced into a vehicle against her will.

The woman somehow kept her composure and was able to convey landmarks flashing by her without her abductors realizing.

Within seven minutes—as the woman laced her conversation with "Columbia Pike," "7-Eleven," "Star something" and other guideposts—Keaton, who grew up in Northern Virginia, was able to pinpoint the location of the 1993 Mazda MPV and send police cruisers racing to her rescue early Sunday.

"You're doing really well, just keep the line open," Keaton, 42, said. "I know where you are."

Steve Souder, administrator of Arlington's Emergency Communications Center, yesterday credited the composure of the woman, who had been raped by her abductors, as well as Keaton's skill for the safe conclusion.

The incident, he said, illustrates a growing trend in law enforcement: More and more 911 emergency calls are coming from wireless phones. The Federal Communications Commission said that up to 40 percent of all 911 calls now are made from wireless phones. But with the new trend comes a problem: Souder said police should have been able to pinpoint the location of the victim's call instantly, just as they can with conventional phones.

PHONE, *From A1*

"There is technology being developed," Souder said. "We're just not getting it fast enough."

Souder said he expects the number of 911 calls from wireless phones to continue to rise, which will mean more calls coming from unknown locations. A system that allowed police to know where a call is coming from would have also helped a 24-year-old woman who used her cell phone to call police—from the trunk of her car—after she was abducted by a carjacker earlier this year in Arlington, he said.

Sunday's abduction occurred early in the morning in the District after the victim, a 29-year-old Annandale woman, took a friend home from a dance club, said Lt. John Crawford, an Alexandria police spokesman. A man she had met there called her on her cell phone and asked her location. Soon after, the man and a friend pulled up to 14th Street and New York Avenue in a maroon van and forced her inside, he said.

The men drove her to a home being renovated in the 1400 block of Juliana Place in Alexandria, where they sexually assaulted her between 5 and 7 a.m., Crawford said. She was then forced back into the van.

Police are uncertain why her abductors allowed her to use her phone, but the victim pretended to call a friend when she really dialed 911.

That call was answered by Alexandria police. "We began to coordinate where she was, and then there was a connection problem and they lost the 911 caller," Crawford said. "We alerted Arlington County."

As the van headed into Arlington, the woman managed to place another 911 call, at 7:04 a.m.

Keaton answered. When he realized there was something wrong, he began asking the yes-or-no questions.

"Is it blue?" Keaton asked about the van.

"No," she answered.

"Is it red?" he said.

"Sort of," she replied.

When the woman said the van had pulled into a 7-Eleven and that there was a store nearby, "Star something," Keaton knew where she was. He sent Arlington police to the 1100 block of South George Mason Drive.

Alexandria police later charged Juan Cueva, 27, of the 450 block of North Armistead Street in Alexandria, and Remberto Martinez-Chavez, 25, of the 400 block of South Wakefield Street in Arlington, with rape. They were being held yesterday without bond in the Alexandria jail.

"She kept a clear head and was very, very helpful," Souder said. "She was very composed. But the tears flowed when it was over."

Souder said the problem of wireless phone location will grow as more and more callers use the technology. About 86 million people now have cellular service, industry surveys say.

Travis Larson, spokesman for the Cellular Telecommunications Industry Association, said the industry is working hard to create the hardware so 911 communication centers can identify the location of a wireless call. The FCC has set a deadline for fall 2001, he said.

"We're working feverishly to meet the upcoming deadline," he said. "The technology is not in place yet. We're only one-third of the equation."

An FCC official acknowledged yesterday that developing a system that will track a wireless phone call requires coordination among many entities, including carriers, manufacturers and public safety agencies.

"We recognize this is quite complex technology," the official said.

But on Sunday, it was old-fashioned police work that caught the suspects. Keaton, who teaches at the police academy, said he just did what he tells his students to do.

"I teach people to listen to what is *not* being said," Keaton said. "Her choice of words was very good. I could tell that she couldn't talk to me."

Inability to Trace Cellular Calls Hinders Arlington's 911 Rescue

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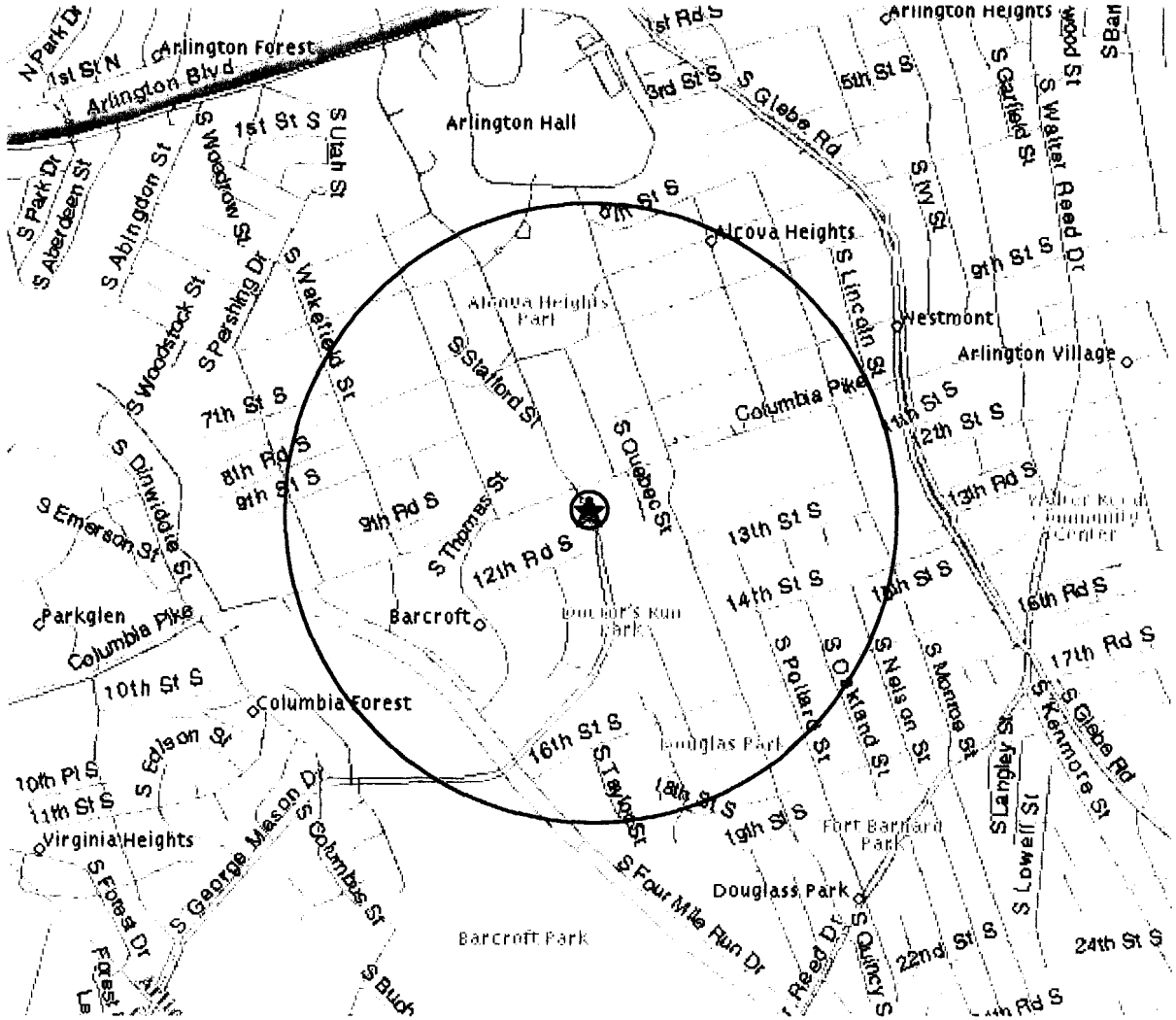
Arlington: 50 m v. 750 m



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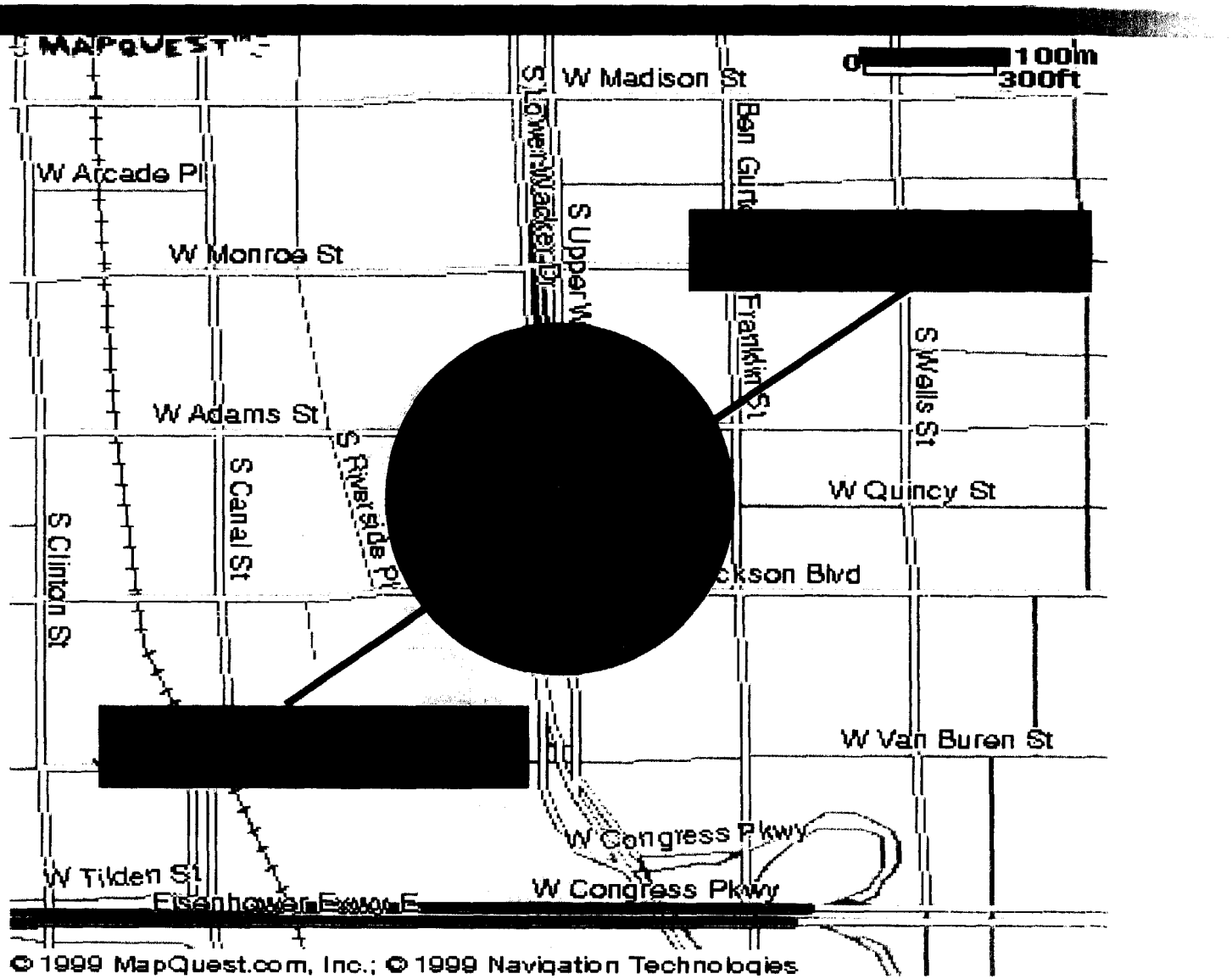
Chicago: 50m v. 100m accuracy



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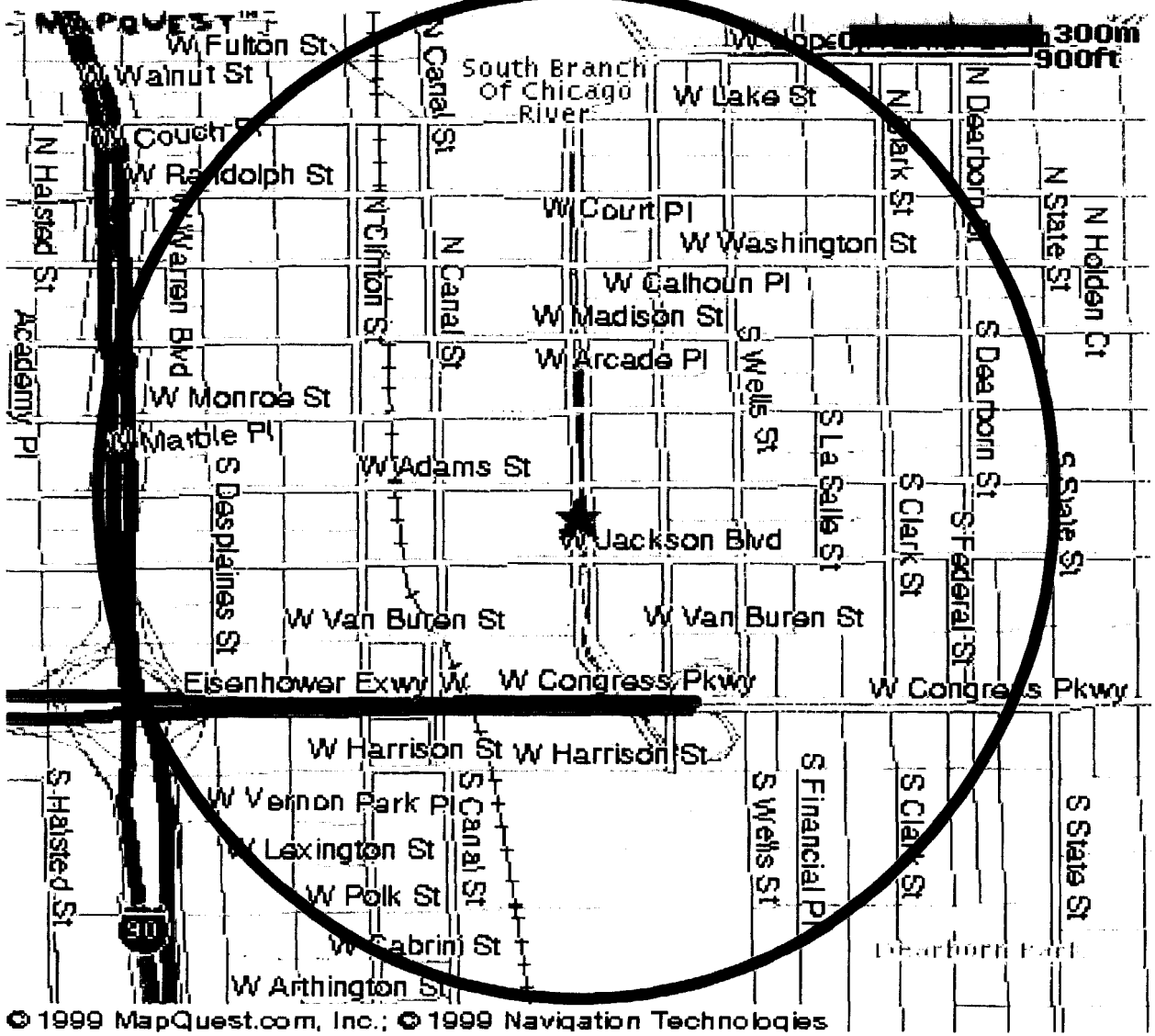
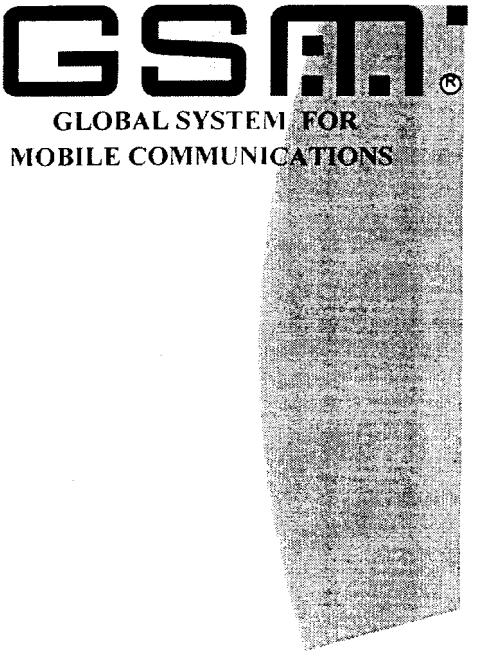
Chicago: 750m accuracy



ETSI TS 101 724 V7.3.0 (2000-02)

Technical Specification

Digital cellular telecommunications system (Phase 2+); Location Services (LCS); (Functional description) - Stage 2 (GSM 03.71 version 7.3.0 Release 1998)



Reference
RTS/SMG-030371Q7R2

Keywords
Digital cellular telecommunications system,
Global System for Mobile communications
(GSM), GSM, LCS

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Contents

Wireless

ISSUESNET

From the August 9, 1999 issue of *Wireless Week*

Omnipoint Seeks GSM Location Market

By Peggy Albright

Long before the U.S. global system for mobile communications operator Omnipoint Communications Services was born, an earlier offspring of the parent company was busy in Colorado Springs, Colo., developing wireless network equipment and helping evaluate technology strategies for U.S. operators.

That older sibling, now a wholly owned subsidiary of Omnipoint Corp, called Omnipoint Technologies, Inc., is lesser known than the GSM carrier today. In at least one respect, however, it is seeking to develop a larger reach.

"We want people to know that we're a technology company," said Gregg Davis, a product manager at OTI. While OTI functions in part to meet the needs of its parent company, the subsidiary is pursuing its own product line with a technology focus that it believes could compete in a larger market: location services for GSM operators, both here and abroad.

The development of location technologies in this country is driven by the FCC's mandate that operators provide capability to identify the location of a call to within 400 feet of its origin at least two-thirds of the time, by Oct. 1, 2001. Value-added services such as traffic reports, concierge services or identification of nearby restaurants based on a mobile customer's actual location in real time will be introduced by operators seeking to create additional revenue streams that use the technologies developed for 911.

But in GSM-dominated Europe, OTI expects general demand for wireless data-not 911 per se-will be a key driver for deployment of location-based services. And GSM carriers will be looking to the United States for recommendations, through the European Telecommunications Standards Institute, on how to deploy the technology.

"ETSI has realized now on several fronts that the United States might be further ahead in a particular area," said Bo Piekarski, senior director for strategic business initiatives at OTI. "They defer to the United States and then allow the United States to make a recommendation to ETSI that might be accepted by the broader community worldwide."

Three location standards have been developed for offering location services on GSM networks. The first is an uplink-based time difference of arrival system that is network centric and does not need any changes to handset technologies and thus will work on all legacy handsets. For such systems, OTI is working with Ericsson Inc. to develop a location measurement unit that can be installed at cell sites to provide the triangulation from other sites to identify the origin of the call. While OTI is working jointly with Ericsson on this product line, the equipment will work on location systems provided by Ericsson and other infrastructure vendors. Initially designed to work in the North American 1900 MHz systems, the products will also function at both 900 MHz and 1800 MHz to reach European GSM markets.

A second approach, a downlink standard called "enhanced observed time difference," is mobile centric and requires development of special handset technologies as well as some network enhancements. For GSM carriers seeking handset-based operating strategies, OTI also is developing location measurement units that would be used on E-OTD systems as well.

The third location standard for GSM, use of assisted global positioning system technologies, is an area

that OTI is currently investigating.

Given the diversity of deployment scenarios in the United States and abroad, OTI believes it will be able to offer products for either TDOA or OTD options, and it aims to partner with other providers in developing comprehensive solutions.

"What we want to do is make the installation of the units and how they're used by the operators as generic as possible," Piekarski said.

The company intends to develop equipment that will help keep costs down, is simple to install and maintain and could work within a carrier's larger operations and maintenance programs.

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Published by Cahners Business Information

Meeting the E911 challenge — and the location services opportunity

The choices you make today to get ready for E911 will have significant ramifications in customer satisfaction, legal liability, privacy, costs and the ability to offer value-added location services in the long term. To make the challenge even more interesting, there are a variety of competing technologies available now with more still in development, and the FCC has yet to resolve some key issues related to both technology and cost recovery.

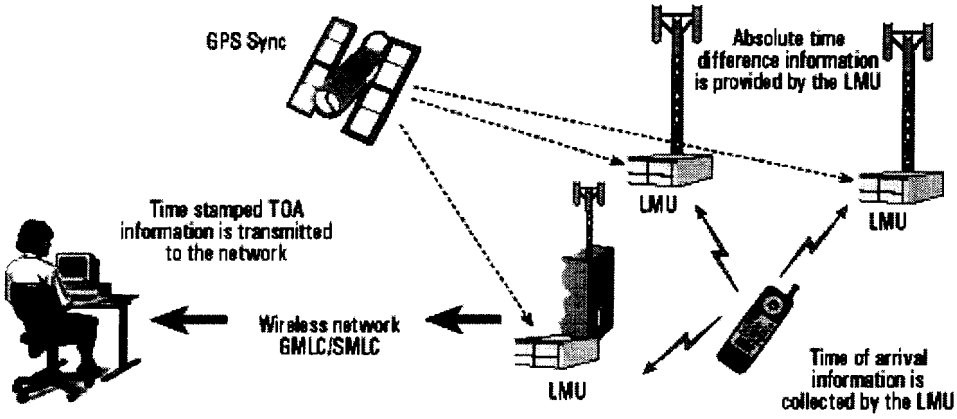
Two things are clear, though: a thorough examination of the technical possibilities and an agile approach to implementation are the safest ways to proceed. And no matter which path you choose, an experienced technical partner can help guide the way.

How Omnipoint can help

Whether you're a network operator, service provider or equipment supplier, Omnipoint Technologies can help you make the transition to the location-based services market:

- **Systems consulting and engineering.** Every location technology option involves some significant engineering decisions. In addition to choosing between network-centric and mobile-centric location methods, for instance, you also have to decide which of several possible network architectures makes the most sense for you. We've been involved in wireless network design and integration for more than a decade, including some of the pioneering GSM installations in North America. Moreover, we are actively involved in the development of both GSM and LCS standards, so our engineering team lives on the leading edge of all the relevant technologies.

- **LMUs for GSM systems.** Our first location measurement unit, the heart of most location determination system architectures, is based on the uplink-time of arrival method (the first multiple location technology to be standardized for GSM networks). This solution meets all the demands of Phase 2 of the FCC's regulatory requirements for implementation by October 2001.



- **Location technology for OEM applications.** The measurement and computation technologies we're developing for location services can also be adapted for OEM applications. Discuss your application with our location specialists, and we'll help you plan the best way to add location capabilities to your products or systems.

Please request a free copy of our E911/LCS brochure, which explains the various technical challenges and measurement and computation solutions involved in mobile location services.

For further information contact Info@omnipoint.com, If there is a problem with our site please contact the webmaster@omnipoint.com